Game Changing Development

LOX-CH4 Propulsion

Completed Technology Project (2018 - 2019)

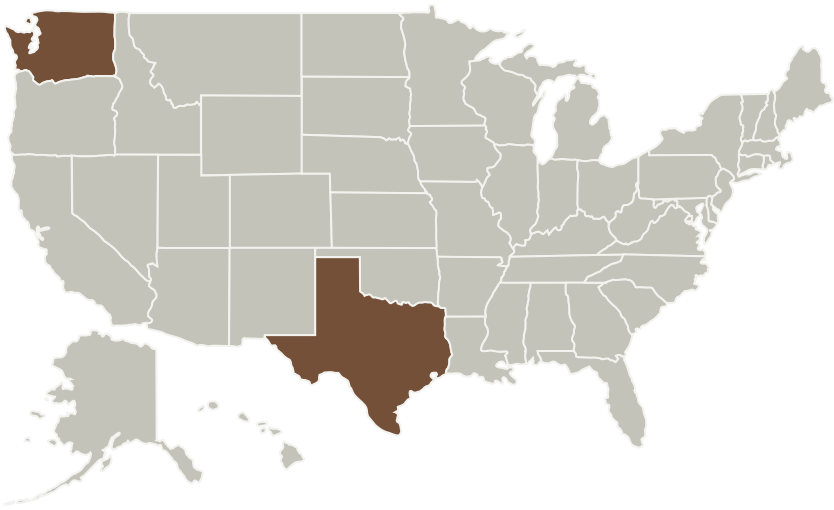
Project Introduction

This task is a collaboration between Blue Origin, MSFC, and JSC to develop new concepts for liquid oxygen/liquid methane and liquid oxygen/liquid hydrogen propulsion systems for lunar landers capable of landing large masses on the surface of the Moon. This propulsion system could enable more cost-effective transportation architectures for use in future NASA missions.

Anticipated Benefits

This propulsion system could enable more cost-effective transportation architectures and increasing NASA analysis and testing capabilities for use in future NASA missions.

Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
Blue Origin, LLC	Lead Organization	Industry	Kent, Washington

Primary U.S. Work Locations	
Texas	Washington

LOX-CH4 Propulsion

Table of Contents

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Blue Origin, LLC

Responsible Program:

Game Changing Development

LOX-CH4 Propulsion

Completed Technology Project (2018 - 2019)

Project Transitions

October 2018: Project Start

November 2019: Closed out

Closeout Summary: Safe and routine flight operations at extreme altitude gen erally require crew and passengers to wear a pressure suit to enable them to su rvive in case of failure of the cabin pressurization system. Current suits that me et this requirement are very expensive, heavy, and often restrict mobility neede d to complete research tasks, continue flight, or descend safely to a survivable a ltitude. An affordable suit that meets all flight requirements will greatly enhance the safety and efficacy of such flights. Final Frontier Design's intra-vehicular acti vity (IVA) space suit is designed to do exactly that, and was tested through a se ries of parabolic flights supported by NASA's Flight Opportunities program. Testi ng included comparative human-in-the-loop data of subject performance in 1 g and 0 g, and both suited and unsuited. Data collected included metabolic and bi ometric data, suited range of motion, and subject comfort. End users for the IVA suit design could include NASA, orbital flight providers such as SpaceX, Sierra N evada, Boeing, and suborbital flight providers including Blue Origin and Virgin G alactic.

Project Management

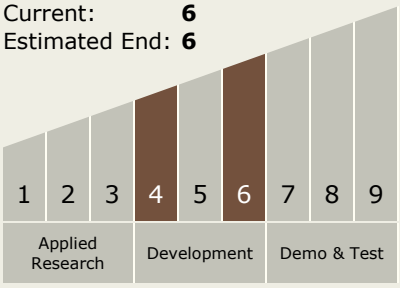
Program Director:
Mary J Werkheiser

Program Manager:
Gary F Meyering

Principal Investigator:
Dj Kroger

Technology Maturity (TRL)

Start: **4**
Current: **6**
Estimated End: **6**



Target Destination

The Moon